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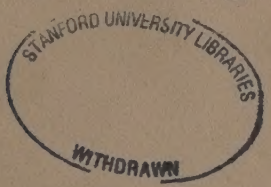
THE HORTICULTURAL STATUS

OF THE

GENUS VACCINIUM

WELTON MARKS MUNSON.



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THE HORTICULTURAL STATUS

OF THE

GENUS VACCINIUM

A Thesis Presented to the University Faculty of
Cornell University for the Degree of
Doctor of Philosophy,

BY

WELTON MARKS MUNSON.

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THE HORTICULTURAL STATUS OF THE GENUS VACCINIUM.

The members of the genus Vaccinium, though indigenous to this country, and supplying in large quantities fruit which is surpassed in quality by but few of the more generally cultivated species, have received comparatively little attention from horticulturists. In 1898 a report upon the Blueberry in Maine was published by the Maine Experiment Station. The object of the present paper is to present as concisely as may be the exact status of the group at the close of the nineteenth century, and if possible to extend the knowledge of these plants in such a way as shall insure a more just appreciation of their horticultural value.

There is much confusion in the vernacular names applied to members of the genus Vaccinium. The terms "Bilberry," and "Whortleberry" usually mentioned as "common names" by American writers, are seldom or never heard among the common people in this country, while "Huckleberry" is often used indiscriminately for plants of this genus and for the Gaylussacias. In the central states the term Huckleberry is usually applied to *Vaccinium corymbosum*, while Blueberry is given to the low growing species like *Canadense* and *Pennsylvanicum*. In New England, Huckleberry is reserved for species of Gaylussacia, while Blueberry is applied to the lower growing species as above, and High-bush Blueberry to *corymbosum*. There is no satisfactory explanation of the word huckleberry, which in English works occurs only in those of recent date.[1] The red berried species are, in general, referred to as cranberries.

[1] The Latin writers of the middle ages generally referred to plants of the genus Vaccinium as *Myrtillus*, and the fruit was known as myrtleberry. It is not improbable that the term Whortleberry is a corruption from myrtleberry (Cf. Prior, Pop. Names, Brit. Plts. 121) and that the American colonists further changed the name to "hurtleberry." The transition from hurtleberry to huckleberry was easy by simply dropping the first r, i. e., hutleberry. Others derive the name Whortleberry from the Anglo-Saxon *heort-berg*, hart-berry, or as we would say, deer-berry. The question is discussed by Sturtevant in the Transactions of the Massachusetts Horticultural Society, 1890, p. 18.

In England the common names, as collated by Sturtevant, are: Whorts or Whortleberries and Bilberries; in France, Airelle, Aurelle, Myrtilles, Myrtilles des bois, Bluete; or in Brittany Lucets, and in Normandy Mawrets. In Sweden they are called, in Upland, Blabar; in Smoland, Slinner; in Scania, Bollion; in Lapland, Zirre and Zerre. In Brabant the usual terms are, Crakebesein, Haverbesein and Postelbesein; in Germany, Heydelbeeren, Bickbeeren, Blawbeeren, Schwartzbeeren; or for some species, Drunkelbeeren, Rauschbeeren, Grosse Heidelbeeren, Moosheidelbeeren, etc.; in Italy, Myrtillo; in Russia, Ticherniza, Pjaniza, Goluble, etc.[1]

DISTRIBUTION.

The genus includes about 125 species of wide geographic distribution, extending from the Arctic circle to boreal sub-tropical regions, and the high mountains of the tropics; most common in North America and the Himalayas. There are in North America proper about twenty-five species and in Mexico and Central America as many more. The Himalayan region is particularly rich in species many of which are epiphytic. With very few exceptions (e. g. *erythrinum* in Java and *emirnense* in Madagascar) the genus is unrepresented in the southern hemisphere and in the lower regions of the tropics.

The most widely distributed species are, perhaps, *Myrtillus* and *uliginosum,* which occur in middle and northern Europe, Asia (except in the central part from the Himalayas to Thianschan, where all vacciniums are absent), Canada and central North America southward to New York and Colorado, and westward to Alaska. *Uliginosum,* especially, is confined to northern and mountainous regions. *Vitis-Idæa,* also, has a wide distribution somewhat similar to *Myrtillus.* It is common in the higher woodlands and mountains of middle and southern Europe, in America southward to New England, Lake Superior and British Columbia.

In several places in Germany, as stated by Drude,[2] wild hybrids between the foregoing species and *V. intermedium,* Ruthe, are not uncommon. The hybrids have evergreen foliage.

[1] Sturtevant, Trans. Mass. Hort. Soc., 1890, 18.
[2] Eng. and Prant. Pflanzenfamilien, 4:51.

Though *erythrocarpon,* of the southern Alleghanies, is not found in the old world, a very closely allied species, *Japonicum,* is found in central Japan and China—these two species forming a unique type intermediate between the blueberries and the cranberries. In Japan Vaccinium is numerous in species, but, with the exception of the red fruited *V. Japonicum* and the black fruited *V. ciliatum,* they are not very abundant and are mostly confined to alpine summits where the species are found which in the extreme north encircle the earth; and blueberries nowhere cover the forest floor with the dense undergrowth which is common in our northern woods.[1]

Of the purely American species, the most important ones are: in the East, *cæspitosum, Canadense, corymbosum, Pennsylvanicum and vacillans,* together with the cranberries, *macrocarpon, Oxycoccus* and *Vitis-Idæa;* in the South, *Myrsinites* and *virgatum;* in the Northwest, *myrtilloides* and *ovalifolium.*

HISTORICAL NOTES.

The vacciniums have been strangely overlooked alike by horticulturists and by historians. Pliny, Vergil and Theophrastus make brief reference to them; Dodoens,[2] in 1578, and Gerarde[3] and Parkinson in the early part of the seventeenth century give brief discussions of several forms. Parkinson says:[4] "There are divers sorts of these low shrubs which must all go under the name of Whorts or Whortleberries, although there is much difference between them." He then describes nine different sorts, the first two being referred to as "Bilberries."

In America the fruit must have been used extensively by the Indians in colonial times, though there are few records of such use. Parkinson refers to Champlain who in 1615 found the Indians near Lake Huron gathering blueberries for their winter store. Kalm speaks of the Indians drying the fruit by the sunshine or by the fireside for winter use. Roger Williams mentions: "Attitaash (Whortleberries) of which there are divers sorts; sweet like currants. . . . Sautaash are these currants

[1] Sargent, Gard. & For. 6:254.
[2] Lyte's Dodoens, 670. (1578)
[3] Herballe, ed. 2, 1418. (1633)
[4] Theatrum Botanicum, 1459. (1640)

dried by the natives and so preserved all the year; which they beat to powder and mingle it with their parched meal, and make a delicate dish which they call Sautauthig, which is as sweet to them as plum or spice cake to the English."[1]

Until very recently no attempt has ever been made at improvement by cultivation.

USES OF THE FRUIT.

As before noted, the records concerning the uses and distribution of the vacciniums are meagre. Enough is known, however, to indicate that from the earliest times various species have been recognized as of value for food or ornament. Pliny[2] mentions the use of *vaccinia* to dye the garments of bond-slaves to a purple color.

Dodoens, in 1578, says:[3] "With the juyce of them (especially of the black kinde) is made a certayne medicine called of the apothecaries *Rob,* the which is good to be holden in the mouth against great drieth and thirst in hoat agues.....Fen or Marrische (marsh) Whortes doe also quenche thirste, and are good against all evil inflammation or heat of the blood."

Gerarde also, in 1633, writes:[4] "The juice of the black Whortleberries is boyled till it become thicke and is prepared or kept by adding honey or sugar unto it: the apothecaries call it *Rob,* which is preferred in all things before the raw berries themselves.....They be goode for a hot stomacke, they quench thirst, and allay the heate of burning agues.....The people of Cheshire do eat the blacke Whortles in creame and milke as in these south parts we eat strawberries.....The Red Whortle is not of such a pleasant taste as the blacke, and therefore not so much used to be eaten; but they make the fairest carnation color in the World."

Parkinson, in 1640, quotes Gerarde concerning the medicinal value of the "bilberries," and says further:[5] "With the juyce of the berries Painters do color paper or cards, doe make a kind

[1] Roger Williams' Key, 231; cited by Tuckerman, foot note in Josselyn's N. E. Rarities, 92.

[2] Lib. 16 cop. 18, cited by Gerarde, Herballe, ed. 2, 1419.

[3] Lyte's Dodoens, 670.

[4] Herballe, ed. 2, 1419.

[5] Theatrum Botanicum, 1459.

of purple blew colour, putting thereto some allome and Galles, whereby they can make it lighter or sadder as they please. And some poor folkes, as Tragus sheweth, doe take a potfull of the juyce strained whereunto an ounce of Allome, foure spoonfulls of good Wine vinegar, and a quarter of an ounce of the waste of the copper forgings, being put together, and boyled all together, they put their cloth, wooll, thred, or yarne therein, letting it lye for a good while, which being taken out and hung up to dry and afterwards washed with cold water will leave the like Turkie blew colour, and if they would have it sadder they put thereto in the boyling an ounce of broken Galles."

As already noted, the most widely distributed member of the group is *V. Myrtillus,* and this species is very generally used as an article of diet or in making drinks. In the Orkneys the fruit is large and is used for wine.[1] The Scotch Highlanders eat the berries in milk and "make them into tarts and jellies, which last they mix with their whiskey to give it a relish to strangers."[2] In England they are found in the markets and "are eaten in tarts or with cream or made into jelly,"[3] while in Poland, "mixed with wood strawberries and eaten with new milk they are considered a great delicacy."[4] In France they are esteemed as a fruit and are used for coloring wine.[5]

The berries are also of considerable importance for food in Germany, Siberia, and with the Indians of the Rocky Mountains.

V. uliginosum, after *Myrtillus* the most widely distributed species, has large, juicy, black fruits, which are eatable but not agreeable in flavor as ordinarily found, and are commonly believed to be unwholesome. Gmelin reports their extensive use in Siberia, though there they are believed to promote intoxication. It is probable, as is known to be the case with *V. Vitis-Idæa,* that in the far North the quality is better than further south. The western Eskimos, according to Seeman, collect the berries and freeze for winter use.[6] Of the species, Loudon says:[7] "In France they are used to color wines red; and in

[1] Dickson, Pr. Essays Hort. Soc., ser. 2, 7:132, cited by Sturtevant, l. c.
[2] Lightfoot, Fl. Scot. 1:201, cited by Sturtevant, l. c.
[3] Loudon, Arb. et Fruit. 2:1157.
[4] Ibid, 1158.
[5] Aspelin, Fl. Oecon. 520 (1784) cited by Sturtevant, l. c.
[6] Sturtevant l. c.
[7] Loudon, Arb. et Fruit. 2:1158.

Siberia and Sweden they furnish an ardent spirit that is highly volatile and intoxicating. The leaves are added to *Lycopodium alpinum* by the Icelanders; and a yellow dye for coloring woollens is produced by an infusion of the two plants."

Of *Vitis-Idæa* Loudon says:[1] "The berries are scarcely to be eaten raw, but they are made into pies in Derbyshire, and in Sweden a rob or jelly is made from them which is eaten with all kinds of roast meat. In Sweden this preserve is also considered an excellent medicine in colds, sore throats, and all irritations of the mouth or fauces. In Siberia the berries are macerated during the autumn and part of the winter in water; and afterwards they are eaten in a raw state, and fermented along with barley or rye, and a spirit distilled from them; or with honey, and a wine produced. Sweetmeats are also made of them with honey or sugar, which in 1814 we found in frequent use at Moscow at balls and masquerades. The berries of this plant form an important article of commerce in the sea ports bordering the Gulf of Bothnia, whence they are sent to the south of Europe along with cranberries."

In the colder parts of North America, and along the coast of Maine[2] the berries of this species are highly prized for food and are esteemed above the common cranberry for jellies and sauces.

The berries of *V. ovalifolium* are used largely by the natives of the Northwest in making a dainty which they call *le brou*. The berries are gathered before they are quite ripe, pressed into a cake, dried and laid by for winter use. "For use a quantity is put into a vessel of cold water and stirred rapidly until it appears somewhat like soap suds. It is pleasant to the taste, with a slightly bitter flavor."[3] Funston, in a recent report on the flora of Alaska, says concerning this species:[4] "A shrub four feet in height, forms a large part of the undergrowth near the coast (Yakutat Bay, Alaska). The dark purple berries, rather larger than peas, are collected in great quantities by the Indians who use them fresh and preserve them for winter, drying the fresh berries by artificial heat. In September, immediately after the close of the fishing season, nearly all the women

[1] Arb. et Fruit, 2:1165.
[2] Harvey, Trans. Maine Pom. Soc., 1895, 52.
[3] R. Brown, Jr., Bot. Soc., Edinburgh 9:384.
[4] Contrib. U. S. Nat'l Herb. 3:No. 6, cited by Gard. and For. 9:70, (1896).

and children devote themselves to collecting and drying blueberries for winter."

Of all the American species used for food, the most important are, perhaps, *corymbosum, Pennsylvanicum, Canadense,* and *vacillans.* The first of these, the High-bush Blueberry, or Swamp Blueberry, or "Huckleberry" of the middle west, is of firm texture, good size and excellent flavor. The shrub is easily transplanted, grows rapidly on any good soil and, more than any other species, shows a marked tendency to vary in the size, shape and quality of its fruit. It is the natural starting point in attempts to add the blueberry to the list of cultivated fruits. During the past few years it has received considerable attention as a garden fruit, especially in New England.[1]

The other species named grow mostly on uplands—*Pennsylvanicum* especially, on dry sandy "barrens"—and form the bulk of the blueberry crop as seen in the cities or at the canning factories.

USE FOR ORNAMENTAL PLANTING.

Among the plants which lend tone to the landscape in October and November by reason of their bright foliage, many of the species of Vaccinium may be included, the brilliant red, crimson and orange colors often persisting much longer than the bright hued leaves of a majority of other plants.

Of the ornamental species none are more strikingly beautiful late in the autumn than the common high bush blueberry—*V. corymbosum.* When well grown it is a stout, thick, spreading bush eight to ten feet high. The plant is beautiful when in flower; the fruit is attractive and of the best quality; and the bright scarlet and crimson effects in late autumn, rivalling the sumach in brilliancy, are unsurpassed. As an ornamental plant the species deserves a place in every garden.

Pennsylvanicum also brightens waste places for a short time, but drops its foliage too early to be worthy of planting as an under shrub. The same is true of *Canadense,* which is in many respects similar. *Stamineum* (the Deerberry), though early deciduous, is attractive when in bloom, and throughout the summer, by reason of its graceful habit. The deerberry is found

[1] The Blueberry in Maine, Rep. Me. Ag. Exp. Sta., 1898, 170.

over a wide range in the northern states and in the mountains south. Though usually found on gravelly soil, it will thrive in any good garden soil, and it is one of the very few ornamental shrubs specially suited for densely shaded situations. Although not abundant in our woods, it is not rare and its chaste beauty entitles it to a place among valuable native ornamental plants.

Arboreum, introduced into the Kew Gardens by John Cree in 1765, forms an irregular shrub too diffuse and straggling to be of value except in masses at the south. *Hirsutum,* from the mountainous regions of North Carolina and Alabama, is as beautiful in its autumn coloring as is *corymbosum* and like that species retains its foliage late in the season. *Vitis-Idæa* and *uliginosum,* with their shining box-like foliage, are effective as edging for the shrubbery border. *Ovatum* is characterized by Douglas[1] as "one of California's most beautiful hedge plants," but it has as yet received little attention in cultivation.

PROPAGATION.

The spread of any plant in cultivation is, to a large extent, dependent upon the activity of progressive nurserymen. If these men find a given class of plants difficult of propagation, such plants are seldom widely cultivated. In the past one chief drawback to the dissemination of the blueberries has been the difficulty, or supposed difficulty, of propagation. The few nurserymen who have offered them for sale have usually depended upon the native heaths and pastures for their supply of plants, rather than upon the nursery rows. The results have been most discouraging, and the blueberries, though among the finest of fruits, are almost unknown in cultivation.

In the case of the cranberries, propagation is performed almost exclusively by cuttings. With the blueberries grafting is easily performed and in this way specially choice individuals may be perpetuated. For general purposes, however, seedlings or division will be used. Propagation by seed naturally requires care and skill, but is entirely feasible, and the method may be detailed in this connection. At the Arnold Arboretum Jackson Dawson has for many years grown seedling blueberries, and his method is essentially as follows:[2]

[1] Gard. and For. 6:116, (1893).
[2] Cf. Country Gent. 1885, 660.

Seed pans or boxes, about four inches deep are half filled with potsherds and covered with a layer of sphagnum, after which a compost of the following composition is used: one part good fibrous peat (upland preferred), one part well rotted pasture sod, and one part clean fine sand, free from iron rust. The soil is firmed with the hand, or, better, with a mallet.

The seed, washed free from pulp of freshly gathered fruit, is then sowed thickly over the surface, pressed down slightly with a board and covered with the slightest possible sprinkling of soil. Over this is put a light covering of sphagnum and water is applied with a fine rose. The boxes are then placed in a cold frame and allowed to get a few hard frosts. About the first of January they are brought to a house with a night temperature of 55 to 60° and a range of 10° higher by day, watched carefully and kept moist but not saturated. As soon as the young seedlings appear, the sphagnum is gradually removed and a small quantity of compost sifted in among the plants.

When the first or second true leaf has expanded, the seedlings are pricked out into fresh pans or boxes prepared like the first; slight shade is given on bright days and the atmosphere of the house kept moist by wetting down the walks. The plants themselves are syringed but slightly, and the temperature is kept as even as possible.

About midsummer the plants are again handled and the same treatment as before is continued until about Sept. 1, when more air and less moisture are given, that the plants may be gradually hardened off and later removed to a cold frame for the winter. As frost approaches, the frames are protected with mats that the foliage may be retained as long as possible.

After the leaves drop, the frames are covered with a few inches of meadow hay or litter and left for the winter; except that the frames are opened once or twice each month to admit the air. Early in April a bed, about 18 inches deep, of rich, peaty loam is prepared. In this the young plants are set four to six inches apart, syringed morning and evening and shaded by lath screens during the brightest sunshine until thoroughly established.

By the end of August all water is withheld, that the wood may ripen off for winter. At the approach of winter a few

inches of loam between the plants, to prevent heaving, is the only protection required. The following spring, or two years from seed, they may be planted out permanently.

Mr. Dawson has sown seed from September to January and, while most of it grew the first season, some delayed until the second year and then came up well. Seed that is kept until dry and then sown, even in autumn and kept in heat all winter, will seldom germinate until the second year.

Notes from Maine: At the Maine Experiment Station the writer has grown several hundreds of seedlings and, while in general following the method suggested by Mr. Dawson, has not found the extreme attention to details absolutely essential. Our practice has been to wash the seed from the pulp soon after harvesting, put it in cloth sacks and stratify in moist sand until early the following spring, allowing it to freeze in the meantime. Seed pans with liberal provision for drainage, are then filled with potting soil, to which is added a considerable portion of leaf mold, and the seed is sown as before described. Partly from force of circumstances, and partly from design, the seedlings were not given the best of care; but after being handled once were, late in the summer, transferred to the cold frame where they were simply covered with litter during the winter. The following spring they were transplanted into beds, shaded until established, and made a good growth during the summer. Naturally, however, the better care will produce larger plants and, where practicable, should be followed.

The low blueberry *(V. Pennsylvanicum)* will usually fruit in from three to four years from seed, but *V. corymbosum* requires four to six years.

CULTIVATION.

Within the past quarter of a century various spasmodic attempts have been made at the cultivation of the blueberry; though probably, as long as the fields and mountain slopes yield such an abundant natural supply as at present, this section of the genus Vaccinium will not receive the attention, in the way of cultivation and improvement, that its importance deserves. In the wild state the fruit is certainly more worthy of notice than was the blackberry, the raspberry or the currant.

Some writers have the mistaken notion that blueberries require a poor soil. One writer goes so far as to say: "Blueberries will not grow in cultivated ground, neither can they be grown from cuttings nor can their tips be layered. The only possible way to transplant them is to cut a sod from a matted berry patch and transplant it into *sod* ground. An old worn out pasture makes the best berry land."[1]

Such a statement hardly needs refuting. There is no doubt that the plants will do better if the roots are not too much disturbed in removal, but the poor sod land is not a requisite to successful culture.

In 1868 a successful amateur attempt at cultivation was made by J. W. Scott, Bridgewater, N. Y., but pressure of other work finally crowded it out.[2]

About 1875, Jackson Dawson, at the Arnold Arboretum, Jamaica Plains, Mass., began the culture of blueberries from seed, and has demonstrated the possibility of successfully cultivating most of the more common species.[3]

In 1883, and for a few succeeding years, Professor E. S. Goff of the New York Agricultural Experiment Station, made some attempts at culture, but the work finally yielded to the pressure of other duties. A similar fate befell like work at the Michigan Agricultural College in 1887.

In 1886, Frank Ford & Sons, Ravenna, Ohio, offered at least three different species of Vaccinium and one Gaylussacia in their nursery catalog and said: "This much neglected fruit, which is of great value and easy of cultivation, ought to be found in every fruit garden. Its perfect hardiness and adaptation to all kinds of soil, render it as easy of cultivation as any of the small fruits, and it can be grown anywhere that corn will grow."

In 1891 at least three American nurserymen offered blueberries for sale, and in 1893 as many as nine species were on the market—though not largely grown.

In 1898, at the Maine Agricultural Experiment Station the work was taken up systematically, and is still in progress.

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[1] "S. A. H." Rural New Yorker, 1886, 252.

[2] An. Rep. N. Y. Agr. Exp. Sta., 1883, 287.

[3] Country Gentleman, 1885, 660.

Several instances of the successful and profitable garden culture of blueberries are cited in the Annual Report of the Maine Agricultural Experiment Station, 1898.[1]

While for the production of improved types it will doubtless be necessary to resort to the culture of seedling plants, the length of time required for results and the careful attention to details in the management of seedlings, as well as the uncertainty of results, will restrict such culture to the experiment stations, or to a few enterprising nurserymen. The ordinary fruit grower may, however, secure a stock of plants from a neighboring pasture or swamp, and by giving the same attention to culture which he would give to currants may secure very satisfactory results. For this purpose, the high-bush blueberry, *V. corymbosum* and its varieties are perhaps the best sorts. They are relatively easy to transplant, either from swamp or upland, and are of good size and very prolific. The variety *amœnum* is a rather dwarf form with very large berries and grows freely on the upland. *V. vacillans* is the next best species for cultivation as a "small fruit."

THE BLUEBERRY INDUSTRY.

Although from the earliest colonial times the blueberry has been highly prized as an article of food, very little attention has been given to the systematic exploitation of our resources in this direction.

In many of the northern and eastern states—particularly in New England, New York, Michigan and the mountains of Pennsylvania and West Virginia—there are thousands of acres of land worthless for agricultural purposes which, after the pine is removed, send up an abundant growth of blueberry bushes, alders, poplars, grey birches and spiræas. It is believed that by proper management these lands may be made to yield a handsome profit to their owners, and furnish employment to a large number of people.

At the present time these lands are, for the most part, considered as public property, and irresponsible parties, recognizing the fact that the blueberry crop is more abundant on young bushes which spring up after a fire, recklessly burn over vast areas and destroy valuable forests for their own selfish gain.

[1] Rep. Maine Agr. Exp. Sta. 1898, 170

Although very large quantities of fruit are gathered throughout the northern and Atlantic states, the industry has been more nearly systematized in New England than elsewhere. One writer in 1887 states[1] that he ships an average of 1,000 bushels a year from his farm in New Hampshire and as many more for his neighbors. He estimates that on one branch of the Boston & Maine Railroad as many as 20,000 bushels are shipped annually.

THE BLUEBERRY BARRENS.

In the southeastern part of Maine, there are about 150,000 acres known as the "blueberry barrens." Much of this land was burned over by the Indians before the colonial period and since the removal of the timber from the remainder, it too has been repeatedly burned to keep down the growth of birches and alders, and to facilitate the harvesting of the fruit.

About 40,000 acres of the barrens belong to Mr. William Freeman of Cherryfield, Maine, who may properly be regarded as the pioneer in the blueberry industry of America. After long and bitter litigation he proved beyond question his right to charge royalty for all fruit gathered on his lands and established a systematic method of treatment which is applicable, under most conditions, everywhere. The method is somewhat as follows:

[1] Country Gentleman, 1887, 565.

The land is divided into several tracts, each of which is leased to some responsible party who assumes the whole care of burning, keeping off trespassers, harvesting and marketing the fruit. The owner receives, as rental, one-half cent per quart for all the fruit gathered.

The pickers receive from one and a half to three cents per quart; those who lease the land and haul the fruit to the canning factory, or to the station for shipment, one-half to one cent per quart,—the rate being determined, in accordance with the market values, by the firm which handles the product. The fruit is all canned or shipped by one firm which keeps a record of the amount as it is brought in, and pays the royalty to the owner.

Every year a certain section of each "lease" is burned over. This burning must be done very early in the spring, before the soil becomes dry; otherwise the fire goes too deep, the humus is burned from the ground and most of the bushes are killed. Many hundred acres on what should be the best part of the "barrens" have thus been ruined. The method most commonly used in burning a given area, is for the operator to pass around the section to be burned, dragging after him an ordinary torch or mill-lamp. He then retraces his steps and follows over the burned area, setting new fires in the portions which have escaped and back-firing if there is danger of spreading unduly over areas which it is desired to leave unburned. A device occasionally used consists of a piece of one-half inch gas-pipe, bent at the end at an angle of about 60 degrees. The end opposite the bent portion is closed with a cap or plug, and in the other end, after filling the pipe with kerosene, is placed a plug of cotton waste or tow. This device is by many regarded as superior to the lamp or torch, as it is more easily handled. Each section of the lease is usually burned over every third year.

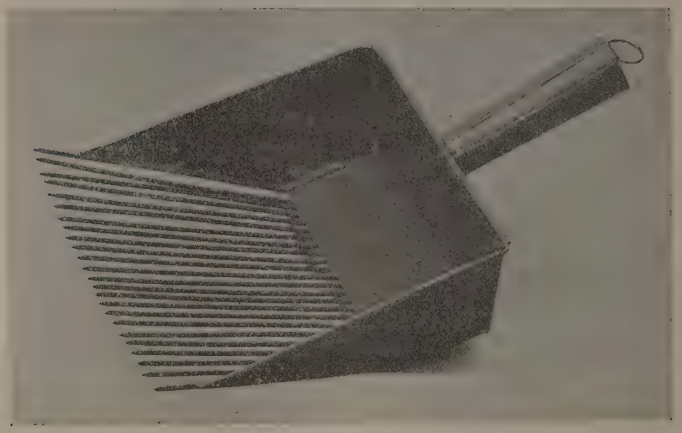
By far the largest proportion of the fruit is taken to the factories for canning. Early in the season, however, before the factories are opened, a considerable amount is shipped to the larger cities for use while fresh. This fruit is usually shipped in quart boxes, shown in the figure. The blueberries have an advantage over other small fruits in that, with the exception of currants and gooseberries, they will stand rough handling better, and will keep longer than the others.

A BOX OF BLUEBERRIES.

All of the early fruit is picked by hand, and only the ripe berries are gathered. Later in the season, particularly on "old burns," i. e. on areas which will have to be burned over the next year, the fruit is gathered with a "blueberry rake." This is an implement somewhat similar to the cranberry rake in use on Cape Cod, and may be likened to a dust pan, the bottom of which is composed of stiff parallel wire rods. The fruit may be gathered much more quickly and more cheaply by means of the rake. The bushes are, however, seriously injured by the treatment. In no case should the rake be used in gathering the high-bush blueberries. As the berries are gathered they are passed through a fanning mill before being sent to the canning factory; and again, at the factory, they are submitted to a much stronger winnowing. This is usually the only preparation necessary.

Wm. Freeman, Esq., Cherryfield, Maine, may properly be regarded as the father of the blueberry industry in America. His account of the beginnings of the industry is given herewith.

The canning of blueberries on a commercial scale was begun in Maine as early as 1866 when A. L. Stewart of Cherryfield packed some of the fruit procured from the neighboring wild lands for the Portland Packing Company. J. W. Jones, a pioneer in the corn packing industry, was engaged in the canning of blueberries in 1870, as were also William Underwood and Company, Jonesport, Maine.



BLUEBERRY RAKE.

Before canning the fruit was deemed practicable, "the plains" were considered common property and people came for fifty and even one hundred miles for a week's outing and to gather blueberries for their own use, and to sell to the merchants of neighboring cities and villages. The timber on the plains was fast being destroyed by fires which were set by the blueberry pickers and, in 1870, Mr. Freeman, who owned some forty thousand acres of the wild land, decided to charge a small royalty for the fruit picked on his lands. Most of the packers paid the small amount demanded without question, but the Underwood Company refused and after repeated attempts to get them to recognize his right of property, a suit for trespass was instituted by the owner. The trespass continuing, other suits were brought and the case was finally carried to the supreme court before it was decided. The final decision was a complete victory for Mr. Freeman—a judgment of $1,700 being granted and the

right of owners of public lands to sell "stumpage" for blueberry or other fruits being established once for all. Mr. Freeman's action not only benefited other owners of wild lands, as well as himself, but it resulted in the perfect system of management already detailed.

A BLUEBERRY CANNING FACTORY.

The financial importance of the blueberry industry is very difficult even to estimate at the present time. In Maine the canning of blueberries is largely in the hands of a few leading packers. The largest of these factories has a daily capacity of 700 bushels and the average annual output is 8,300 cases of two dozen cans each; representing 6,250 bushels of fresh fruit. The average price per case for the canned fruit is $1.90. In other words, the value of the annual product of this one factory is not far from $15,000.[1]

There were in 1900 seven factories in Maine which engaged in canning blueberries. These were as follows:

J. and E. A. Wyman, Cherryfield,
Burnham and Morrill, Harrington,

[1] This is the Wyman factory which handles Mr. Freeman's fruit. As will be seen, Mr. Freeman's royalty will amount to $1,000, —and this from land which is otherwise worthless.

L. A. and A. R. Logie, Columbia Falls,
J. A. Coffin, Columbia Falls,
A. L. Stewart and Son, Cherryfield,
Lawrence Bros., Jonesboro,
L. A. and A. R. Logie, Vanceboro.

The value of these factories is about $50,000. Those at Jonesboro and Vanceboro were erected in 1900.

The number of hands employed in the various factories would aggregate about a hundred, but including the pickers, there are from one thousand to two thousand men, women and children employed in the blueberry packing industry during the canning season. About $30,000 are distributed among the pickers each year.

The total canned product of the "blueberry barrens" in 1899 was about 50,000 cases and the price per case was $2.20, making the value of the blueberry crop in this one small section considerably more than $100,000.

In northern Michigan large quantities of fruit are shipped each year but there is no systematic management of the blueberry lands. The Western Express Company, through the courtesy of the Superintendent, Mr. S. A. Davis, records the following shipment of blueberries in northern Michigan for 1900: Saulte Ste. Marie, 650 cases (16 quarts each); Sturgeon River, 38 cases; Ispheming, 544 cases; Wetmore, 220 cases; Marquette, 200 cases; Seney, 1,719 cases.

The last season was a very poor one for blueberries in upper Michigan, the crop having been largely destroyed by late frost. Large quantities are usually shipped from Baraga, whereas none were shipped last year. From Wetmore, which reports 220 cases, the normal shipment is about 3,000 cases, and Sturgeon River which reports but 38 cases is usually one of the best shipping points.

WHITE BLUEBERRIES.

White or pinkish fruits, instead of the usual deep blue colored berries, are not uncommon in certain localities. In some cases these are simply albino forms; in others the color is due to a fungous growth. In the gardens of the Maine Experiment Station some of the albino forms are now fruiting, and, aside from the color, they are perfectly normal.

Albino forms of certain species—as *V. Myrtillus*—were early observed. Dodoens, in 1578, mentions "some that beare white Berries when they be rype, howbeit they are but seldome seen."[1] White fruits are catalogued by Ruppius in Flora Jenensis in 1726, and were found by Gmelin in Siberia in 1768.[2] In 1854, John Booth of Floetbeck nursery, near Hamburg, Germany, offered for sale plants of a white fruited form of *V. Myrtillus* which had been obtained from the Black Forest.[3] A white fruited form of *Vitis-Idæa* is also noted as occurring at Lyngdalen in the province of Christiansand in 1761.[4]

V. PENNSYLVANICUM, ALBINO.

White fruited forms of *Pennsylvanicum* and *corymbosum* have been observed by the writer; white *vacillans* is reported in

[1] Lyte's Dodoens 670.
[2] Cited by Sturtevant, Trans. Mass. Hort. Soc. 1890, 25.
[3] Loudon, Arb. et Fruit. 2:1157.
[4] Fl. Dan. 1:9.

Garden and Forest, 1893, and other species are recorded.[1] Ascherson and Magnus[2] have made a special study of the color and form variations of Vaccinium, and citations are given which show the very general distribution of albino forms throughout the world.

No special reason for this difference in color can be assigned. The white forms are found growing (usually in colonies) by the side of the normal type. If exposed to full sunlight, the fruit is very likely to have a blush cheek, or even to be of a scarlet color.

The albino forms must, however, be carefully distinguished from the "white berries" caused by the presence of a fungous growth. One of these white forms was described in 1859 by Döll as *V. Myrtillus* var. *leucocarpon*. But in 1879 Schroeter showed that the white color was due to a fungus which he called *Peziza baccarum* (now *Sclerotinia baccarum*).[3] Ten years later Woronin gave a full account of similar white berries found by him in Finland on *Vitis-Idæa, Oxycoccus* and *uliginosum*,—three species which are also common in the United States—and of the fungus producing the color.[4]

BOTANICAL NOTES.

Vaccinium (Origin of the name obscure); *Vacciniaceæ*.

Branching shrubs, creeping vines or small trees (sometimes epiphytes), with alternate, often coriaceous, evergreen or deciduous, sometimes membranaceous leaves; flowers small, white, pinkish or reddish in lateral racemes or terminal clusters, sometimes solitary in the axils, mostly nodding on slender bracted pedicels and bearing blue black or red berry-like fruits, mostly edible. *Calyx* 4-5 toothed, adherent to the ovary, persistent, forming a crown-like appendage to the fruit. *Corolla* various in shape, usually campanulate, cylindraceous or urn-shaped, rarely sub-globose, 4-5 toothed or cleft. *Stamens* distinct, included within the corolla tube or exserted; anthers often 2-awned at the back, the cells separate and prolonged upward

[1] Garden and Forest 8:503, (1895).
[2] Berichte d. deut. Bot. Gesell. 1890, 387-400.
[3] Gard. and For. 2:50, (1889).
[4] Mem. Acad. St. Petersburg, 1888.

into tubes at the apex, opening by terminal pores or chinks. *Pistil* single, with a 4-5 or 8-10 celled ovary which is glabrous or hirsute. Flowers in spring with or before the leaves, berries ripe in summer and autumn, sweetish or sometimes acid, mostly edible.

THE NATURAL GROUPS OF SPECIES.

In making the following natural divisions of the genus I have, in general, followed Bentham and Hooker, but have included the group Oxycoccus, after Gray in Synoptical Flora. When two closely related forms occur over a wide range in latitude, the assigned differences are very liable to fail at some point.

Key to the Groups.

A. Ovary 4-5 celled (rarely 8-10 celled in Vitis-Idæa).
  B. Stamens exserted
    C. Filaments villous.....OXYCOCCOIDES.
    CC. Filaments puberulent.....OXYCOCCUS.
  BB. Stamens included
    C. Filaments glabrous or pubescent EUVACCINIUM.
    CC. Filaments pilose.....VITIS-IDÆA.
AA. Ovary 10celled (sometimes imperfectly so in Cyanococcus).
  B. Anthers with two awns on the back...BATODENDRON.
  BB. Anthers awnless.....CYANOCOCCUS.

OXYCOCCOIDES, B. & H.

Erect branching shrubs with deciduous membranaceous leaves and berries of *Euvaccinium,* but with corolla of true *Oxycoccus:* flowers solitary, axillary, on long pedicels, pedicel bractless, but minutely 2-bracteolate at the base. *V. erythrocarpon*
V. Japonicum

OXYCOCCUS. (*Oxycoccus,* Pers.) Gray.

Corolla deeply 4-cleft or 4-parted; the lobes linear or lanceolate-oblong, reflexed; stamens 8, exserted, anthers awnless, with very long terminal tubes; ovary and berry 4-celled; flowers, pale rose-colored, axillary and terminal, nodding on long filiform pedicels; appearing in early summer; fruit maturing in autumn.
  C. Stems very slender, creeping.....*V. Oxycoccus*
  CC. Stems stouter, with ascending branches
V. macrocarpon

EUVACCINIUM, Gray.

Corolla ovate to globular, more or less urceolate, 4-5 toothed, rose or white; filaments glabrous; anthers 2-awned, included; ovary and berry 4-5 celled with no false partitions; leaves deciduous; flowers drooping, solitary or 2 or 4 together, developing with or soon after the leaves.

C. Corolla commonly 4-lobed; stamens 8..... *V. uliginosum*
CC. Corolla commonly 5-lobed; stamens 10.
D. Plants dwarf, a foot or less high.
E. Branches not angled ..... *V. cæspitosum*
EE. Branches sharply angled ..... *V. Myrtillus*
DD. Plants taller, 1—12 feet high.
E. Margins of leaves sharply serrulate. *V. myrtilloides*
EE. Margins of leaves entire (except in *ovalifolium*).
F. Size of leaves ½ in. long. *V. ovalifolium*
FF. Size of leaves ¼–¾ in. long. *V. parvifolium*
V. Mortinia

VITIS-IDAEA (Koch.) Gray.

Corolla cylindraceous, ovate, or globose-campanulate, more or less urceolate, rose or nearly white, 4-5 lobed, stamens included, filaments hairy; anthers awnless (or with short awns); leaves coriaceous and persistent; flowers in short racemes or clusters from separate buds; bracteate and 2-bracteolate.

C. Ovary 5-celled; stamens 10.
D. Branchlets pubescent.....*V. ovatum*
DD. Branchlets glabrous.....*V. crassifolium*
CC. Ovary 4-celled; stamens 8.
D. Branches short (3-4 in.) from creeping stems *V. Vitis-Idaea*

BATODENDRON, Gray.

Corolla open-campanulate, 5 lobed; anthers tipped with long slender tubes, and 2-awned on the back; ovary and (hardly edible) berry falsely 10-celled; leaves rather firm in texture but deciduous; flowers axillary and solitary or in leafy-bracted racemes, slender pedicelled, bractlets minute or none.

C. Anthers included.....*V. arboreum*
CC. Anthers exserted.....*V. stamineum*

CYANOCOCCUS, Gray.

Corolla cylindraceous to campanulate-oblong or ovoid, 5-toothed; filaments hairy; anthers awnless, included; ovary and berry more or less 10-celled by false partitions; berry blue or black, usually with bloom, edible, many seeded; flowers, short pedicelled, (white or rose) in fascicles or very short racemes, developed with or a little before the leaves; buds separate, large, scaly; bracts and bractlets caducous or deciduous.

C. Foliage evergreen, coriaceous.
  D. Calyx-teeth roundish and very dense. *V. nitidum*
  DD. Calyx-teeth acute. ..... *V. Myrsinites*
CC. Foliage deciduous (sometimes tardily so in southern forms).
  D. Corolla cylindraceous ..... *V. Virgatum*
  DD. Corolla short and usually broad.
    E. Branchlets hirsute ..... *V. hirsutum*
    EE. Branchlets glabrous or glaucous (except in *V. Canadense*).
      F. Leaves glaucous and pale beneath. *V. vacillans*
      FF. Leaves strongly pubescent both sides. *V. Canadense* and var. *atrococcum* of *corymbosum*
      FFF. Leaves glabrous, often hairy on midrib beneath.
        G. Margin of leaves bristly-serrulate.
          H. Fruit mostly blue-glaucous. *V. Pennsylvanicum*
          HH. Fruit black... *V. nigrum*
        GG. Margin of leaves entire or at most ciliate. *V. corymbosum*

A HORTICULTURAL CLASSIFICATION.

As already indicated, the genus under consideration includes many species of particular importance as food plants, others which are useful only for ornament, and some which are valuable for both purposes. The following key to the more commonly known species is based upon leading horticultural characters.

A. Cultivated chiefly for fruit.
  B. Color of fruit red.
    C. Stems slender, trailing; leaves evergreen.
      D. Apex of leaves acute..... *Oxycoccus*
      DD. Apex of leaves obtuse or retuse. *macrocarpon*
    CC. Stems stouter though creeping; branches erect, tufted ..... *Vitis-Idaea*
    CCC. Stems erect, much taller (2-10 feet).
      D. Leaves small (¼–¾ inch long). *parvifolium*
  BB. Color of fruit blue or black.
    C. Plant low, ½–3 feet high.
      D. Foliage evergreen.
        E. Leaves small (¼–½ inch long). *nitidum*
        EE. Leaves larger (½–1 inch long). *Myrsinites*
      DD. Foliage deciduous.
        E. Surface of leaves glabrous.
          F. Leaves pale beneath, not shining above.... *vacillans* var. *pallidum* of *corymbosum*
          FF. Leaves not paler beneath (except sometimes in *Pennsylvanicum*); shining, at least above.
            G. Flowers solitary in the axils.
              H. Branches sharply angled. *Myrtillus*
              HH. Branches not angled. *cæspitosum*
            GG. Flowers in fascicles or short racemes.
              H. Fruit blue, glaucous *Pennsylvanicum*
              HH. Fruit black. *nigrum*

EE. Surface of the leaves hairy.
F. Ovary and fruit glaucous. *Canadense*
FF. Ovary and fruit hirsute. *hirsutum*

CC. Plant taller (3—12 feet), spreading.
D. Flowers solitary in axils.
E. Leaves sharply serrate.. *myrtilloides*
EE. Leaves entire or slightly serrulate *ovalifolium*
DD. Flowers in racemes or corymbs.
E. Racemes elongated on naked branches..... *virgatum*
EE. Racemes shorter..... *corymbosum*

AA. Cultivated chiefly for ornament.
B. Plants low, 1—2 feet high.
C. Stems creeping, with branches erect or ascending.
D. Leaves small, shining..... *crassifolium*
DD. Leaves larger, pale or glaucescent. *uliginosum*
CC. Stems erect; twigs red ..... *erythrinum*
BB. Plants taller, 2-20 feet high.
C. Foliage evergreen, rigid..... *ovatum*
CC. Foliage deciduous.
D. Surface shining above, more or less pubescent beneath ..... *arboreum*
DD. Surface paler above, glaucous beneath. *stamineum*
DDD. Surface bright green both sides. *erythrocarpon*

THE MOST IMPORTANT SPECIES.

V. Oxycoccus, L. (Small Cranberry)

Linnæus, Sp. Pl. 351, 1753.

(*Synonyms: Oxycoccus palustris,* Pers., Syn. Pl. 1:419; *Oxycoccus vulgaris,* Pursh. Fl. 1:263.)

Slender creeping plants with short (4-10 inch) filiform stems, leaves ovate, acute or acuminate, ¼ inch long, with revolute

margins; pedicels 1-4, terminal; corolla deeply 4-parted, the lobes reflexed; anthers exserted, with very long terminal tubes; berry red, globose, ¼-⅓ inch in diameter, 4-celled. (*Figured:* Sowerby, Eng. Bot. ed. 1, 5:319; Schlecht., Fl. von Deutch. 20:2039; Reich., Icon. Fl. Germ. 17, t. 1169.)—Sphagnous swamps, Europe, north and middle Asia, North America, Greenland to Japan mostly in sub-arctic and alpine regions, Newfoundland to Alaska and southward to mountains of Pennsylvania, common on rocky islands along the coast of Maine. The cranberry of the old world. It is distinguished from the next species, the American Cranberry, by its very small pointed leaves, rarely ¼ inch long, and by the short ovate segments of the corolla as well as by the terminal inflorescence. Though smaller, its fruit is by many considered superior to that of the next.

V. macrocarpon, Ait. (Larger American Cranberry)

Aiton, Hort. Kew, 2:13, 1789.

(*Synonyms: V. oxycoccus* var. *oblongifolius,* Michx. Fl. Bor. Am. 1:228; *Oxycoccus macrocarpus,* Pursh. Fl. 1:263.)

Stems slender, creeping, elongated (1-4 feet), the flowering branches ascending; leaves oblong or oval, obtuse or retuse, ⅓-½ inch long; whitened beneath; pedicels several, axillary and lateral; berry red or reddish, globose or pyriform, ⅓-1 inch long. (*Figured:* Ait. Hort. Kew, ed. 1, 2:13, t.7; Bot. Mag. t.2586; Emerson, Trees and Shrubs of Mass., ed. 5, 2:456; Meehan, Flowers and Ferns 2:28; Wein, Ill. Gart. Zeit. 1:81; as *Oxycoccus macrocarpus* Bart. Fl. 1, t.17.)—Peat bogs, Newfoundland to North Carolina and westward.

This is the common large fruited cranberry, under cultivation in Massachusetts, New Jersey and elsewhere.

V. Vitis-Idaea, L. (Cowberry, Mountain Cranberry, Foxberry)

Linnæus, Sp. Pl. 351, 1753.

(*Synonyms: V. Punctatum,* Lam. Fl. Fr. 3:396; *V. punctifolium,* Stokes, Bot. Mat. Med. 2:363; *V. buxifolium,* Gillb. Fl. Lituan. 1:4; *V. nemorosum,* Salisb. Prod. 291.)

Plants low (6-10 inches); branches erect from tufted creeping stems; leaves coriaceous, persistent, obovate or oval, ¼-¾ inch

long, dark green and shining above, with blackish bristly points beneath; flowers in short terminal racemes; corolla white or rose-colored, 4-cleft; berries dark red, acid, rather bitter. (*Figured:* Fl. Dan. t.40; Lodd., Bot. Cab. t.616 (as var. "major"); Bot. Cab. 1023 (var. "minor").) Arctic regions of Europe, Asia and Greenland to Japan; south to the coast of New England, Minnesota and British Columbia.

A low, evergreen, shrubby plant which grows in cold and elevated situations in the northern parts of both hemispheres. The blossoms are very delicate and the fruits, which are rather larger than currants, acid and somewhat bitter when uncooked, are largely used in the more northern regions for tarts, jellies and preserves, or as a substitute for the common cranberry. According to Macoun (Gard. and For. 2: 508), the fishermen's families along the Gaspé coast and the north shore of the Gulf of St. Lawrence, gather the fruit of this species in large quantities, for their own use and for sale, calling it "Low-Bush Cranberry." Throughout the whole of northern Canada, hunters and trappers, as well as the native Indians, have frequently to depend upon it for food.

The plant spreads rapidly, is hardy and requires no special care. It is valuable for the shrubbery border where the strong contrast of the dark green foliage and the bright colored persistent fruit is very striking.

V. parvifolium, Smith.

Smith in Rees Cycl. no. 13, 1817; Gray Syn. Fl. 2: 24.

Shrub 6-12 feet high, straggling; with slender, green, sharply angled branches; leaves oblong or oval, obtuse, entire, dull or pale, ¼-¾ inch long; flowers solitary in the axils, corolla globular, nearly white, calyx 5-lobed; berries light red, rather dry. (*Figured:* Hook. Fl. Bor. Am. t.128.)—Shady and low woods, northern California, near the coast to Alaska.

A somewhat straggling shrub, offered for sale by one nurseryman. Of interest rather than of special merit. T. J. Howell of Oregon characterizes the fruit as "of good flavor, excellent for tarts," while Gray says "rather dry, hardly edible."

V. erythrocarpon, Michx.

Michaux, Fl. Bor. Am. 1:227, 1803.

(*Synonyms: Oxycoccus erectus,* Pursh, Fl. 1:264; *O. erythrocarpus,* Elliott, Sketches 1, 447.)

Shrub, erect, divergently branching 1-4 feet high; leaves oblong-lanceolate, acuminate, serrate, thin, 1½-3 inches long; pedicels solitary, axillary, bractless; corolla flesh-colored, ½ inch long, 4-cleft, revolute, berries globose, ½ inch in diameter, light red, turning to deep blue-black at full maturity, watery, slightly acid, "of exquisite flavor," Don. (Not usually regarded as valuable.) (*Figured:* Bot. Mag. t.7413; (as *Oxycoccus erectus*) Wats. Dendrol. Brit. 1, t.31)—Damp woods, higher Alleghanies Virginia to Georgia, July.

A remarkable species in that it combines the flower structure of the Oxycoccus group wth the erect habit and foliage character of the other vacciniums. The specific name is somewhat misleading since, when mature, the fruit is similar to the blueberries, though without the distinct crown of the persistent calyx, found in other vacciniums.

The species was introduced into England in 1806 by Loddiges, but has been cultivated only in botanic gardens.

A closely allied species, *V. Japonicum,* Miquel., (Miq. Ann. Mus. Bot. Lugd. Bot. 1:28, 1863; Maximowicz, Diagnoses Pl. nov. Jap. et Mand., in Bul. Acad. Sci. St. Petersburg 8:603, 1871) is found in central and northern Japan, but has not been introduced into cultivation.

V. nitidum, Andr.

Andrews, Bot. Rep. t.480, 1805.

A diffusely much branched shrub, with smooth branchlets, leaves thick coriaceous, shining above, obovate or oblong; flowers in fascicles on short racemes; the almost persistent bracts as well as the roundish or obtuse calyx-teeth reddish; corolla short campanulate, 5-toothed; berry "somewhat pear-shaped, black." (*Figured:* Bot. Rep. t.480.) —Low pine barrens, Florida and Georgia. (Near to or passing into *Myrsinites*).

V. Myrsinites, Lam.

Lamarck, Encyc. 1: 73, 1783.

(*Synonym: V. nitidum* var. *decumbens,* Sims, Bot. Mag. 1550.)

Low evergreen shrub, erect or decumbent; branches, when young, puberulent; leaves exceedingly variable, oblong-lanceolate and acute to obovate and obtuse, ¼-1 inch long, entire or serrulate, sometimes denticulate, mostly shining above; bracts and calyx-teeth acute or acutish; berries "globose, blue." (*Figured:* (as *V. nitidum* var. *decumbens*) Bot. Mag. t.1550) —Sandy pine barrens, North Carolina to Florida and Louisiana.

The difference between this species and the preceding is obscure. The chief points of distinction seem to be that *Myrsinites* has puberulent branchlets, prominently veined leaves and acute calyx-teeth and bracts; while *nitidum* has smooth branchlets, smaller and faintly veined leaves, with obtuse or roundish calyx-teeth and bracts.

The species is grown as a pot plant in cool houses in England under the name of *V. Sprengelii.* (Gard. Chron. n. s. 19: 473, 1883).

V. vacillans, Kalm, (Low Blueberry, Blue Huckleberry)

Kalm in Herb. Banks; Torr., Fl. N. Y., 1: 444, 1843.

(*Synonyms: V. vacillans* Solander, Gray, Man. ed. 1, 261; *V. virgatum* Bigelow, Fl. Bost., ed. 2, 152; *V. Pennsylvanicum* Torr., Fl. N. U. S. 1: 416, in part.)

Erect, glabrous, with pale yellowish-green branchlets; leaves obovate or oval, entire or sparingly serrulate; flowers in rather loose clusters, generally on leafless summits of twigs; corolla campanulate or cylindraceous, contracted at the mouth; berries large, blue, with much bloom, of excellent flavor, ripening with *V. Canadense.* (*Figured:* Emerson, Trees and Shrubs of Mass., ed. 5, 454.)—Dry, sandy or rocky places, Maine to North Carolina, westward to Michigan and Missouri.

One of the most common species of the northern and central states, particularly west of the Alleghanies. The flowers, on terminal and lateral naked branchlets, yellowish white, often tinged with red, are quite showy; while the fruit is particularly

valuable. The only form it is likely to be confused with is variety *pallidum* of *corymbosum* and from this it is distinguished by the veins and ribs of its leaves being perfectly smooth. Well worthy the attention of cultivators.

V. Myrtillus, (Whortleberry, Bilberry)

Linnæus, Sp. Pl. 350, 1753.

(*Synonym: V. myrtilloides,* Watson, Bot. King Exp. 209, not of others.)

Low shrubs, glabrous; leaves ovate or oval, serrate, conspicuously veined, ½-⅔ inch long; calyx almost entire; berries black, nodding. (*Figured:* Reichenb., Ic. Fl. Germ. 17: 118, t.1169; Eng. Bot., ed. 1, 7: 456; Schlecht., Fl. von Deutch. 20: 2036; Twin. Ill. Nat. ord. 2: 83.)—Mountainous regions Alaska to Colorado and Utah; Europe, Asia.

The most widely distributed species and very generally used as an article of diet and in the making of drinks, particularly in the old world. It is from this species that the common name whortleberry is derived, as stated elsewhere. Not of special importance in America.

V. caespitosum, Michx., (Dwarf Bilberry)

Michaux, Fl. Bor. Am. 1: 234, 1803.

A very dwarf tufted shrub, 2-12 inches high; nearly glabrous throughout; leaves obovate, obtuse or acutish, serrulate, shining on both sides; flowers solitary, corolla obovoid, pink or white, slightly 5-toothed (rarely 4-toothed); berries large, globose, blue with bloom, sweet. (*Figured:* Bot. Mag. t.3429.)—Hudson's Bay and Labrador to Maine and New Hampshire, also alpine summits of Adirondacks; in the Rocky Mountains, Colorado and Utah to Alaska, east to Lake Superior.

It is doubtful if varieties can be distinguished. Var. *arbuscula,* Gray, passes into the ordinary form; while *angustifolium,* Gray, and *cuneifolium,* Nutt., are found to be simply forms produced by shade. The latter form, particularly, is common in New England and early in the season the leaves are of the ordinary obovate type, while later they become elongated.

A boreal or Canadian species of rather limited distribution in the East, common in Maine north of latitude 44° 50′; not found in Labrador north of latitude 54°. York, Maine, is the most southern station known. It is generally regarded as a plant of the highest alpine summits in New England, but it is not uncommon in other localities throughout central and northern Maine. It is abundant at Orono, and Fernald has found that "in the valleys of the Penobscot and its tributaries, the Piscataquis, the Mattawamkeag, and the Wassataquoik, the plant is to be found on almost any ledgy or gravelly riverbank." Most abundant in the valley of the upper St. John.

V. Pennsylvanicum, Lam. (Low Blueberry)

Lamarck, Encyc. 1: 72, 1783.

(*Synonyms: V. myrtilloides,* Michx., Fl. Bor. Am. 1: 223; *V. tenellum,* Pursh, Fl. 1: 288 and Bigel. Fl. Bost. 150, *not* Ait.; *V. angustifolium,* Ait., Hort. Kew, ed. 2, 2: 356; *V. multiflorium,* Dunal in D. C. Prod. 7: 572; *V. salicinum,* Aschers. Flora, 1860, 369, *not* Cham.; *V. multiflorum,* Wats. Dendr. Brit. t.125 (?); *V. ramulosum and humile* Willd. Enum. Suppl. 20 (?).)

A dwarf shrub (6-15 inches) with slender greenish, warty, mostly glabrous branches; leaves membranaceous, oblong-lanceolate or oblong, distinctly serrulate with bristle-pointed teeth, mostly shining on both sides but often hairy on midrib beneath; flowers on short pedicels; corolla campanulate-cylindrical, short; berries large, globose, bluish-black with bloom, sweet; the earliest to ripen north. (*Figured:* Bot. Mag. t.3434; Emerson, Trees and Shrubs of Mass., ed. 5, 2: 456; (photo.) Rep. Maine Agr. Exp. Sta. 1898, 171.)—Dry hills and woods Newfoundland and the Saskatchewan southward to New Jersey and Illinois.

Var. *angustifolium, Gray,* (Man. ed. 1, 261) A dwarf form, with more decidedly lanceolate leaves. *V. angustifolium,* Ait. l. c., *V. salicinum,* Aschers, l. c., not Cham. Summits of mountains northern New York and New England, Quebec to north shore of Lake Superior and northward.

This species is extremely variable in size and shape of fruit and flowers, but with the exception of the variety noted, and the black fruited form often associated with it, which is set off as

V. nigrum, the variations do not appear sufficiently constant to warrant making separations. In general, the plant is of low, semi-prostrate habit, is extremely prolific and thrives on dry sandy hills. It furnishes the bulk of the blueberries found in the eastern markets. When mown down or burned, the new erect shoots produce, the following year, a long spike-like mass of bloom and fruit which may be stripped off by handfuls. Because of its character, and early ripening habit, it is known on the blueberry plains as "early sweet" or "low sweet."

V. PENNSYLVANICUM.

V. nigrum, Britton, (Low Black Blueberry)

Britton, Mem. Torr. Club 5:252, 1894.

(*Synonym: V. Pennsylvanicum* var. *nigrum,* Wood, Bot. and Flor. 199, 1873.)

Low shrub, similar to *V. Pennsylvanicum* and often associated with it. Leaves oblong-lanceolate to obovate, finely serrulate, green above, pale and glaucous beneath; flowers few in the clusters, white or cream colored, appearing earlier than those of *Pennsylvanicum;* berries rather small, black without bloom. (*Figured*: (photo.) Rep. Maine Exp. Sta., 1898. 171.)—Dry rocky soil, Maine to New Jersey, westward to Michigan.

V. NIGRUM.

The species is distinguished from the preceding by the glaucous under surfaces of the leaves and by the characteristic shining, black fruit. It is usually found in colonies in the same situations as *Pennsylvanicum;* but occasionally the two species will be found intermingled.

V. Canadense, Richards. (Canada Blueberry)

(Named by Kalm in Herb Leche, now in Herb Banks; Richardson, in Frankl. 1st Jour. ed. 2, App. p. 12; Hooker, Fl. Bor. Am. 2:32. *Synonym: V. album,* Lam. Encyc. 1:73, not L.)

Erect shrubs, 1-2 feet high, the crowded branchlets downy-pubescent; leaves oblong-lanceolate or elliptical, entire, downy both sides; corolla short, open-campanulate, greenish-white, often tinged with red; berries globose or oblate, blue with much bloom, of excellent flavor. (*Figured:* Bot. Mag. t.3446.)—Low woods, Hudson's Bay to Bear Lake and the northern Rocky Mountains; south to New England, mountains of Pennsylvania and Illinois.

This species, commonly known as "sour top" or "velvet leaf" because of the character of its foliage and the somewhat acid fruit, usually grows in rather moist, rocky, not swampy localities. The fruit is larger and more acid than the other low forms and matures from one to three weeks later. It is not so popular in the general market as the sweeter kinds, but it is very prolific and its lateness in ripening is a point in its favor.

V. CANADENSE.

V. hirsutum, Buckley, (Hairy Blueberry, Bear Huckleberry)

Buckley, Am. Jour. Sci. 45: 175, 1843; Sargent, Gard. & For. 2: 365.

Low shrub, 1-2 feet high, the stems green, grooved, obscurely 4-angled, those of the current year covered with stout, spreading, white hairs; leaves ovate, entire and, together with the pure

white, campanulate, corolla, the calyx and the dark blue globose fruit, hirsute. (*Figured:* Gard. and For. 2: 365.)—Mountains of Cherokee County, North Carolina, (Buckley, Sargent); Tallulah Falls Cañon, Georgia, (J. K. Small); Cade's Cove Mountains, Tennessee, (A. Ruth).

This species, discovered about 1840 by B. S. Buckley "in the mountains of Cherokee County," North Carolina, was lost sight of for half a century until re-discovered by Sargent at Robbinsville, Graham County, North Carolina in 1887, when it was transferred to the Arnold Arboretum. Practically nothing is known of its geographical distribution or habitat. It is readily distinguished, however, by the hairy flower and fruit.

The fruit is described as fully as large as that of *Gaylussacia resinosa,* shining black, and of an agreeable flavor. Under cultivation not so densely hairy as in the wild state. Gives promise of being valuable under cultivation as one of the latest of its kind to ripen,—at the Arnold Arboretum the best period of fruitage being the middle of August, berries remaining into September. It is probable that good results might be obtained by hybridizing with *V. corymbosum* or *V. Canadense.*

V. myrtilloides, Hook. (Gray).

Gray, Man., ed. 5, 291; Syn. Fl. 2: 24, not Michx.

(*Synonym: V. membranaceum,* Douglas ined.)

An erect branching shrub mostly glabrous throughout, the twigs slightly angled; leaves oval, oblong or ovate, acute, serrate, membranous, green both sides but not shining, 1-2 in. long: calyx entire; corolla depressed-globular, yellowish or greenish white; berries large, oblate, black, rather acid. (*Figured:* Bot. Mag. t.3447.) Moist woods, Lake Superior to the coast of Oregon and British Columbia.

The berries are large ½-¾ inch, oblate, with broad calyx; of excellent flavor; much relished by the natives of the northwest. (Howell, in Case Bot. Index, 1881, 38.)

V. ovalifolium, Smith.

Smith, in Rees Cycl. no. 2, 1817; Hook, Fl. Bor. Am. 2: 33.

A slender, straggling, branched shrub 3-12 feet high, with slender, more or less angled branchlets; leaves oval, obtuse, glabrous, green above, glaucous beneath; flowers solitary, on short

recurved pedicels, corolla globose-ovoid; berry large (⅓-½ inch) bluish-purple, with bloom. (*Figured:* Hook. Fl. Bor. Am. 2: 33, t.127)—Woods, Quebec to Michigan, Oregon and Alaska.

This species is very abundant in the northwest, forming a large part of the undergrowth along the southern coast of Alaska, (Funston); but, like many other plants of a similar range it extends eastward through the region of the Great Lakes and the St. Lawrence River. The berries, rather larger than peas, are collected in great quantities by the Indians who use them fresh and dry them for winter. The exceptionally large berries and vigorous habit of this species suggest its value for cultivation and particularly for crossing with the low growing species such as *Pennsylvanicum* and *Canadense*.

V. virgatum, Ait.

Aiton, Hort. Kew, ed. 1, 2: 12, 1789.

(*Synonyms: V. ligustrinum,* Pursh, Fl. Am. Sept., 1: 288, not L.; *V. fuscatum* Ker., Bot. Reg. t.302 (?); *V. Elliottii,* Chapm., Fl. So. U. S. 260.)

A shrub 3-12 feet high, with slender, green branches, the young twigs puberulent; leaves narrowly oval-oblong, acute, often mucronate, entire or minutely serrulate, green and glabrous above, pale or glaucous beneath, ¾-2 inches long; flowers in short racemes on naked twigs; appearing before the leaves; bracts small, deciduous; corolla nearly cylindrical, white or pink; berry black with or without bloom. (*Figured:* Bot. Rep. t.181; Bot. Mag. t.3522; (as *V. fuscatum)* Bot. Reg. t.302.)—Swamps, southern Virginia to Florida and Louisiana.

Var. *tenellum* (Ait.) Gray, (Syn. Fl. 2: 22). A low form, mostly less than 2 feet, with smaller leaves and nearly white flowers in short close clusters. *(V. tenellum,* Ait. l. c., not Pursh; *V. galezans* Michx. Fl. Bor. Am. 1: 232; *V. galiformis,* Smith, Rees' Cycl. no. 16)—Southern Virginia to Arkansas, Florida and Alabama. Probably a distinct species.

The distinction between this species and the next is very slight. It is probable that, possibly excepting var. *tenellum,* this is only a southern form of *corymbosum* and should be reduced to varietal rank, following Don (Gard. Dict. 3: 854).

V. corymbosum, L. (High-bush Blueberry, Swamp Huckleberry)

Linnæus, Sp. Pl. 350, 1753.

(*Synonym: V. disomorphum,* Michx., Fl. Bor. Am. 1 : 223.)

A tall, straggling shrub 4-12 feet high, with yellowish-green, warty, branchlets which later turn brownish; leaves ovate or oblong to elliptical-lanceolate, usually entire; flowers in short racemes on naked twigs; corolla ovate to urn-shaped, or oblong-cylindrical, white or pinkish; berries blue-black with much bloom, of excellent flavor. *(Figured:* Emerson, Trees and

V. CORYMBOSUM.

Shrubs, ed. 5, 2 : 454; Am. Ag. 1886, 364.)—Moist woods or swamps, Newfoundland and Canada to Michigan and Minnesota; through eastern United States to Louisiana; rather rare in the Mississippi valley. Exceedingly variable, and numerous gradations unite the several varieties.

Var. *amœnum*, Gray, (Man., ed. 5, 292), a form with bristly-ciliate, serrulate leaves, bright green both sides, shining above, often pubescent on veins beneath. (*V. amœnum*, Ait., Hort. Kew., ed. 1, 2: 12; Bot. Rep. t.138; Twin. 111. Nat. Ord. 2: 83, 6; Bot. Reg. 400. *Figured*, as *V. corymbosum*, Bot. Mag. t.3433.) Mainly in the Middle Atlantic States.

Var. *pallidum*, Gray, l. c., a pale and glaucous or glaucescent form, with or without some pubescence; ovary more completely inferior, generally low; otherwise resembling *amœnum*. (*V. pallidum*, Ait. l. c.; Gray, Man. ed. 1, 262. *V. albiflorum*, Hook, Bot. Mag. t.3428. *V. Constablei*, Gray, Am. Jour. Sci. 42: 42). Common in mountainous regions southward.

Var. *fuscatum*, Gray, (Syn. Fl. 2: 23), a tall form with the mature and entire leaves fuscous-pubescent beneath; flowers virgately somewhat spicate on the naked flowering twigs. (*V. fuscatum*, Ait., l. c.) Alabama and Florida to Louisiana and Arkansas.

V. corymbosum is one of the most valuable species both for fruit and as an ornamental shrub. It thrives in the garden and is readily susceptible of improvement by cultivation. Toward the south it approaches *V. virgatum*, Ait., and var. *pallidum* may be confused with *V. vacillans*, Kalm.

V. atrococcum, Heller, (Black Blueberry)

Heller, Torr. Bull. 21: 24, 1894.

(*Synonyms: V. disomorphum*, Bigel. Fl. Bost., ed. 2, 151, not Michx.; *V. corymbosum* var. *atrococcum*, Gray, Man., ed. 5, 292.)

A branching shrub with shreddy bark, similar to *V. corymbosum*. Leaves oval or oblong, dark green above, densely pubescent beneath, entire, acute, often mucronate; flowers in short racemes, appearing with the leaves; berry black without bloom, sweet. Moist woods and swamps, Canada to Pennsylvania and New Jersey.

V. crassifolium, Andr.

Andrews, Bot. Rep. t.105, 1798.

(Synonyms: V. carnosum, Pers. Syn. Pl. 1:479; *V. myrtifolium,* Michx. Fl. 1:228.)

Slender, trailing shrub; stems 2-3 feet long, glabrous; leaves small, ¼-½ inch long, oval or narrowly oblong, sparsely serrulate or entire, shining; flowers few, almost sessile, in small axillary clusters, nearly white, or tinged with red; berries black. *(Figured:* Bot. Rep. t.105; Bot. Mag. t.1152.)—Sandy bogs, near the coast, North Carolina to Georgia.

Useful for the shrubbery border, south.

V. uliginosum, L. (Bog Bilberry)

Linnæus, Sp. Pl. 350, 1753.

(Synonym: V. gaultherioides, Bigel. New Eng. Med. Jour. 5:335.)

A stiff, much branched shrub ½-2 feet high; leaves thick, obovate or oval, obtuse or retuse, ½-1 inch long, nearly sessile; flowers 2-4 together, or sometimes solitary; calyx 4-parted, sometimes 5-parted; corolla urn-shaped, 4 or 5-lobed, pink; stamens 8-10; berries bluish-black with bloom. *(Figured:* Fl. Dan. t.231; Reichenb. Ic. Germ. 17, t.1168; Sowerby, Eng. Bot. 6:878 (Ibid. ed. 1, 9:581); Deakin, Flor. Brit. 2, 19, 630; Schlecht., Flor. Deutch. 20:2037; Pratt, Fl. Pl. 3:351.)—Labrador to New England; mountainous regions of New York; Lake Superior to Alaska. Also in northern Europe and Asia.

Usually considered a high mountain species, but found by the writer on the blueberry barrens of eastern Maine and reported as abundant along the ledgy shores of the Carrabassett River (Fernald) and along the St. John at Fort Kent (Furbish) in the same state. The varieties *mucronatum* Herder, and *microphyllum,* Lange, the former from Alaska and the latter from the west coast of Greenland, lat. 70° (Schuchert and White, Torr. Bul. 27:66) are not of importance.

The plant is useful for the shrubbery border in cold wet locations, and its fruit though of poor quality, is used for food by the natives of the northwest.

V. erythrinum, Hook.

Hooker, Bot. Mag. t.4688, 1852.

An erect, glabrous, evergreen shrub with bright red twigs; leaves ovate, obtuse, coriaceous, entire; flowers in long, one-sided, terminal racemes; corolla cylindraceous, 5-toothed, ½ inch long, purple, reddish. *(Figured:* Bot. Mag. t.4688; Lemaire, Jard. Fl. 4: 364; Jour. of Hort. 34: 39.)—Mountainous regions, Java.

Sent to England in 1852 and since grown by various nurserymen as a greenhouse pot-plant. It is a strong plant, furnishing an abundance of bloom in December and January. Not remarkable, but worthy a place in collections. A very distinct type, the only other representative of which, so far as observed, is *V. Rollisoni,* Hook, (Bot. Mag. t.4612).

V. ovatum, Pursh.

Pursh, Fl. Am. Sept., 1: 290, 1814.

(Synonyms: V. lanceolatum Dunal in D. C. Prod. 7: 570; *Metagonia (Pyxothamnus) ovata,* Nutt., Trans. Am. Phil. Soc. ser. 2, 8: 262.)

An erect, rigid, evergreen shrub, 3-8 feet high, with pubescent branchlets; leaves very numerous, thick, shining, ovate or oblong, acute, serrate; flowers numerous, in short axillary clusters, followed by dark purple fruit of agreeable flavor. *(Figured:* Bot. Reg. t.1354; Lemaire, Jard. Fl. 4: 424.)—Vancouver's Island to Monterey, California.

A distinctly western species, and one of California's most beautiful hedge plants, but not well known. *V. ovatum* is very tenacious of life and bears pruning well; propagated from suckers, cuttings, and seeds which it bears freely. Most abundant on the northern mountain slopes of the coast range; but also found growing luxuriantly on southern slopes exposed to bright sunlight. (T. H. Douglas, Gard. & For. 6: 116, 1893).

V. arboreum, Marshall, (Farkleberry, Sparkleberry)

Marshall, Arbust. Am. 157, 1785.

(Synonyms: V. diffusum, Ait. Bot. Mag. t.1607, *Batodendron arboreum* Nutt., Trans. Am. Phil. Soc. ser. 2, 8: 261 and Sylva, 3: 43.)

Spreading shrub or small tree 6-25 feet high, with glabrous or somewhat pubescent branchlets; leaves thinnish-coriaceous, smooth and shining above, obovate to oblong, entire to obscurely denticulate; flowers profuse, axillary and leafy racemose; corolla white, 5-lobed; berry small, globose, rather astringent. (*Figured:* Lodd. Bot. Cab. t.1885; as *V. diffusum,* Bot. Mag. t.1607.)—Sandy soil along river banks, Florida and Texas to North Carolina and Illinois.

The flowers are solitary and axillary along the terminal branchlets, each pedicel being curved near the flower. The leaves on these flowering branchlets are only about half the size of other leaves on the same branches, though in other respects similar. Some regard these leaves as bracts, and regard the inflorescence as "leafy racemose."

The species was introduced into the Kew Gardens in 1765 by John Cree. It forms an irregular shrub too diffuse and straggling to be of value except in masses, for which purpose it is useful at the south.

V. stamineum, L. (Deerberry, Squaw Huckleberry)

Linnæus, Sp. Pl. 350, 1758.

(*Synonyms: V. elevatum* Solander; Dunal in DC. Prod., 7: 567. *V. album,* Pursh, Fl. Am. Sept. 1: 285, not L.)

A divergently branched shrub 2-5 feet high with pubescent or glabrous twigs; leaves oval to oblong-lanceolate, acute, entire, pale, glaucous or sometimes slightly pubescent beneath, 1-4 inches long, ½-1½ inches wide; flowers very numerous in large, leafy-bracted racemes; corolla green, 5-cleft; anthers and style exserted; fruit large, globose or pyriform, greenish or yellowish, few-seeded, almost inedible. (*Figured:* Bot. Rep. t.263. *V. stamineum* H. B. & K. t.353, the *V. Kunthianum,* Klotzsch, has shorter anther tubes and a hairy ovary.)—Dry woods and thickets Maine to Minnesota, south to Florida and Louisiana; rare west of the Alleghanies.

The Deerberry is found over a wide range in the northern states and in the mountains south. It is also recorded as one of the principal plants of the dry pine barrens of southern Georgia (Harper). It is usually found naturally on gravelly

soils in the shade of deciduous trees—particularly black oaks—but will thrive on any good, well drained soil and is a valuable shade-enduring ornamental shrub.

Var. *melanocarpum,* Mohr, (Southern Gooseberry, Mohr, Torr. Bul. 24:25, 1897). Shrub 2-3 feet high, branched from near the base; leaves as in the type, flowers in loosely 4-8 flowered elongated racemes; berries twice the size of the typical form, shining black, with a juicy purple pulp, sweetish, with slightly tart pleasant flavor. Rocky shaded hills in the mountain region of central and northern Alabama. (Mohr).[1]

Supplementary List of American Species.

The following species from various parts of America have been described but as a rule are little known:

From Mexico: *angustifolium* Benth (not Ait.); *confertum,* H. B. & K.; *cordatum,* Hemsl.; *eriocladum* Dunal; *geminiflorum,* H. B. & K.; *Kunthianum,* Klotzsch; *leucanthemum,* Schlecht.; *micranthum,* Dunal; *Schlechtendallii,* G. Don; *villosum,* Smith.

From Central America: *consanguineum,* Klotzsch; *pachyphyllum,* Hemsl.; *secundum,* Klotzsch.

From South America; *affine,* Klotzsch; *Alaternoides,* H. B. & K.; *caracasanum,* H. B. & K.; *didymanthum,* Dun., (Rusby)[2]; *floribundum,* H. B. & K., (Rusby); *penæoides,* H. B. & K., (Rusby); *pernettyoides,* Griseb. (Rusby).

From the West Indies: *assimile* Wright; *Cubense* Griseb.; *meridionale* Sw; *Poasanum,* Donn. Sm.[3]

THE OUTLOOK.

As has been shown, the vacciniums are widely distributed, particularly in eastern and northern United States and Canada; and there are vast areas which, while bearing a considerable number of bushes and yielding a profitable return to the few people who make a practice of gathering the wild fruit, are not utilized as they might be. The systematic treatment of the wild lands as described in the foregoing pages might with profit be extended to many other sections.

There are also large areas, otherwise worthless, which might

[1] Professor Mohr in a personal letter to the writer states that he will raise this variety to specific rank in a forthcoming work—Alabama Plant Life.

[2] Collected by Rusby, Torr. Bul. 20:138.

[3] Species described by Donnel Smith in Bot. Gaz. 24:395, 1897.

without doubt be made to yield good returns if, in some way, a growth of blueberries could be started—either by setting bushes or by scattering seed. The most valuable species for this purpose are *Pennsylvanicum, Canadense,* and *vacillans.* Although this suggestion may be regarded as visionary, it is quite within the range of possibilities.

Another phase of the subject which is worthy of careful attention is that of domestication and the improvement of types by selection. During the last half century the cultivation of the cranberry has become an important and well established industry and several valuable types have been produced. Little has ever been attempted, however, in the garden culture of the blueberry; though there is no doubt that satisfactory results may be obtained. The fruit in its wild state is far superior to that of most other small fruits and is very susceptible to the influence of environment. At the Maine Agricultural Experiment Station systematic cultural experiments are now in progress and in Massachusetts cultivation has been practiced by amateurs with encouraging results. The most promising species for this purpose, as well as for ornamental planting, is the high-bush blueberry *Vaccinium corymbosum.* The natural varieties and improved forms of this species may readily be perpetuated by division or by grafting.

In general, it is probable that within a very few years a race of garden blueberries, rivaling in importance some of the best of the other small fruits, will be placed before the public, and the culture of the blueberry will be as much a matter of course as is that of the blackberry or the raspberry.

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